Inconsistent behavior in online consumer reviews:

The effects of hotel attribute ratings on location

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Abstract

The purpose of this article is to analyze the effects of hotel attribute ratings on location. This analysis is highly pertinent given the prevailing use of reviews and their potential interdependence. Within the framework of prospect theory, the results show that: i) the assessment of location is influenced by the evaluation of other hotel attributes; ii) this influence is asymmetric, in line with the loss aversion phenomenon (the consumer *punishes* the hotel more harshly for dissatisfaction than *praises* it lavishly for satisfaction); and iii) the effect of a change in the evaluations of other hotel attributes on the assessment of location presents a pattern that reverses the diminishing sensitivity property. Relevant research and managerial implications are outlined.

Keywords: reviews; ratings; location; prospect theory; loss aversion; diminishing sensitivity.

1. INTRODUCTION

With the prevalence of social media platforms in the hospitality industry, most people appear to focus on online consumer reviews when searching for useful information and scrutinize reviews of destinations and hotels before, during, and after their trips (Park & Nicolau, 2015). The relevant literature has proven the influence of online consumer reviews and ratings on purchasing decisions, representing a fundamental driver of hotel selection (Antonio, de Almeida, Nunes, Batista, & Ribeiro, 2018; Fang, Ye, Kucukusta, & Law, 2016; Kwok, Xie, & Richards, 2017; Santos & Lopez, 2017; Schuckert, Liu, & Law, 2015; Viglia, Minazzi, & Buhalis, 2016). Certainly, Hensens (2015) suggests that guest reviews and scores may be more insightful than the traditional star classification system in providing indications regarding the true quality and range of services offered by a hotel. Indeed, the summary evaluations of past guests' reviews are used by travel platforms to rank hotels (Fang et al., 2016; Viglia et al., 2016), and the United Nations World Tourism Organization has suggested integrating these into conventional hotel classifications (UNWTO, 2014).

At present, several online platforms exist that display consumer ratings and help people book hotel rooms, such as Expedia, Tripadvisor and Booking.com. These platforms enable people to obtain not only past evaluations of overall service experiences, but also the qualities of specific attributes at the property. In terms of interdependence among the review scores of different attributes, if consumers were rational, not driven by sentiment, and had full analytical capacity, one could assume that the review of an item would be performed in isolation and independently from the evaluation of another item, in line with the foundational principle of microeconomics based on consumer utility maximization (Morley, 1992). Accordingly, consumers might be

considered rational actors who can collect and analyze comprehensive information and subsequently make an optimal decision.

However, another area of cognitive psychology has suggested that consumers have bounded rationality and possess limited ability to process information (Simon, 1972). In this regard, the same heuristics (e.g., reviews and ratings) that are used to reduce tourists' cognitive effort in making decisions might also mislead them because those consumer evaluations may suffer from biased measurement. Thus, this paper aims to assess the interrelationships of online review scores between objective (hotel location) and subjective (cleanliness, comfort, facilities, staff, and value for money) hotel attributes.

Location has been deemed a fundamental hotel attribute that has an impact on prices, market share and firm performance (Chou, Hsu, & Chen, 2008; Enz, Canina, & Liu, 2008; Lee, Kim, Kim, & Lee, 2010; Molina-Azorin, Pereira-Moliner, & Claver-Cortés, 2010; Schegg & Stangl, 2018) as well as on guest experience (Shoval, McKercher, Ng, & Birenboim, 2011). From a managerial perspective, once the hotel has been located, it is almost impossible to reposition it due to the substantial sunk cost required for its establishment (Yang, Tang, Luo, & Law, 2015), and the long-term impacts associated with operations and logistics (Lee & Jang, 2017). Location constitutes the only attribute of a hotel property that is relatively fixed, as opposed to, for instance, services, cleanliness, and interior design, which are flexible and varied (Yang, Mao, & Tang, 2018). In order to address this research goal, this study applies the framework of Kahneman and Tversky (2013)'s prospect theory. In particular, the existence of two properties – *loss aversion* and *diminishing sensitivity* – are tested to estimate the asymmetric effects as well as the changing patterns of the potential influences between the consumer rating of hotel location and the ratings of other hotel attributes.

2. LITERATURE REVIEW

The websites that collect online opinions about hotels usually ask for a quantitative assessment on different attributes of the property visited. The number of attributes evaluated varies among websites: four items are requested by Expedia, six by Booking.com, or twelve by HRS. A usual attribute asked about is "location". Websites such as Booking.com, Agoda, Ctrip or HolidayCheck, as well as hotel metasearch engines such as Trivago, Kayak, Momondo or HotelsCombined provide information on ratings of location. However, websites such as HRS or those belonging to the Expedia group (Expedia, Hotels, com, Orbitz, Travelocity) do not show information on this item[1]. Today, location is an attribute that has become more tangible as the consumer can see what the surroundings of the hotel look like from home. In general, OTAs and metasearch engines present a map-based function to show images of the hotel's location. In addition, the interactive maps of many websites and apps include information on the location of stores, museums, monuments or attractions, with the possibility of including a real view, both aerial or at street level. This degree of reality -and, in theory, of accuracy- with which the information on location is presented should reduce intangibility and, in turn, uncertainty about what the guest will find once at the hotel.

Before the advent of the Internet, the analysis of consumers' perception of hotel location was limited (Arbel & Pizam, 1977). However, the possibilities offered by the hotel reviews, with huge databases that provide specific information on location have fostered the development of this type of research. With a few exceptions, like the proposal of Xiang and Krawczyk (2016) who use text analytics to look for terms related to location in hotel online reviews, most research has been

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[1] While TripAdvisor used to show the ratings of the following six attributes: value for money, comfort and equipment, bed quality, cleanliness, location, and service (Flôres, Dos Anjos , Souza & Gadotti, 2014; Yang, Mao, & Tang, 2018; Zaman, Botti, & Thanh, 2016), it does not seem to release this information in a disaggregated way anymore.

conducted by using the numerical values assigned to location (Korfiatis & Poulos, 2013; Peiró-Signes, Segarra-Oña, Verma, Mondéjar-Jiménez, & Vargas-Vargas, 2014; Zhou, Ye, Pearce, & Wu, 2014). In this line, Zaman, Botti, and Thanh (2016) attempt to determine the importance of each of the six criteria used by TripAdvisor in hotel selection and find that location was ranked third; de Oliveira Santos (2016) confirms that location has a positive impact on prices; and Yang et al. (2018) use ratings of location to look into guest satisfaction and determine the factors that explain the level of those ratings of location. Interestingly, Aksoy and Ozbuk (2017; p. 79) use Booking.com data on location and find that "the postpurchase evaluations made on hotel location by consumers are quite rational and can be associated with objective metric indicators".

Assuming consumer rationality and considering that the degrees of tangibility and objectivity of the attribute "location" should be higher than other hotel attributes, anything happening to the latter should not have an effect on the former; in other words, a dissatisfaction - and in turn, a low rating- with comfort or the service provided by the staff should not have an influence on the assessment of location. Importantly, however, while tourists are supposed to act rationally through their decision making process, like any other consumers, some studies show evidence that they do not always behave rationally (Jung & Kim, 2016; Okumus, Okumus, & McKercher, 2007; Smallman & Moore, 2010). Simon (1972) proposed a theory of bounded rationality suggesting that consumers' rationality is restricted due to people's cognitive limitations and decision contexts (e.g., level of uncertainty on the decisions). There is criticism that it is almost unfeasible for people to obtain complete information and have the ability to accurately calculate the utility of an alternative (Jung & Kim, 2016). A rational decision takes place in a limited sense because people do rely on a satisfying decision, rather than an optimal decision.

Considering the features of consumers involving mobility and environment facing numerous service encounters, the setting of the decision-making process is not identical as the general consumer behavior closely associated with utility maximization. Indeed, consumers are more likely to be irrational than rational because of the uncertainty inherent in service experiences (Tsai & Lu, 2012). Specifically, information processing does not adopt approaches to memorizing or saving all of the detailed problems. Instead, it is acquainted with the fundamental processing method and applies it into different problems they directly encounter (Payne, Bettman, & Johnson, 1993). Some scholars have also showed evidence of inconsistency in consumer behaviors (Irmak, Block, & Fitzsimons, 2005; Park & Nicolau, 2018). For example, the study conducted by Thaler (1981) suggests that the discount rates are not linear, but varies depending on the choice context, such as waiting time until the reward occurs and the size of the reward.

Moreover, this divergence from rationality that exists in travel decision-making might also be reflected in consumers' behaviors when they have to write reviews about their service experiences. In principle, content creators are considered honest and sincere when writing online reviews and providing recommendations (Lu & Stepchenkova, 2012) and, according to Duverger (2013), because these reviews are posted by genuine customers, they are perceived as unbiased. Nevertheless, apart from the fact that users may not necessarily collect accurate information, their reviews can often be driven by emotions, particularly when used for venting their anger against organizations (Clark, 2013). Accordingly, the presence of inconsistent behaviors in the context of online consumer reviews has been detected by empirical research. Jang, Kim, and Park (2014) identified the discrepancies between textual comments and numerical ratings in consumer reviews of hotel services. These authors accounted for the existence of discrepancies with regard to two types of uncertainty, including reference uncertainty associated with previous product reviews,

and heterogeneous uncertainty related to consumers' diverse backgrounds and experiences. Importantly, Blackshaw and Nazzaro (2006) describe consumer-generated content as "a mixture of fact and opinion, impression and sentiment, founded and unfounded tidbits, experiences, and even rumor" (Blackshaw & Nazzaro, 2006, p.4). Accordingly, even though location might be characterized as an attribute that is more objective than other hotel attributes (Aksoy & Ozbuk, 2017), the performance (and assessment) of these other attributes that are subjective elements of hotel services (i.e., cleanliness, comfort, facilities, staff and value for money) still can have an effect on the evaluation of the hotel's location, because of the potential irrationality and emotion-driven behavior involved. Consequently, the following hypothesis is stated:

H.1. The assessment of location is influenced by the evaluation of other hotel attributes.

Along with the argument that consumer choices are often subject to the framing of a problem/task, the *loss aversion* property of prospect theory (Kahneman & Tversky, 2013) seems to better explain the asymmetric effects of the evaluation of hotel attributes on the assessment of hotel location than the expected utility theory (Betts & Taran, 2006). Prospect theory is a behavioral theory in cognitive psychology describing how an individual chooses an alternative under risk (Kahneman & Tversky, 2013). This theory argues that people make a choice based upon the estimated values of gains and losses relative to reference point, rather than the absolute value of the outcome.

The framing of alternatives is considered as one of key drivers of choices in prospect theory. Consumers assess the potential values of the outcomes within various prospects – alternative outcomes as either gains or losses compared to reference points. Then, people weight

the results of gains or losses by the subjective probabilities of the occurrence. The asymmetric weights (a nonlinear function) between gains and losses arise, proceeding risk-seeking for losses and risk-averse for gains (Betts & Taran, 2006; Prieto, Caemmerer, & Baltas, 2015). Individuals get more disutility from a loss than they obtain from an equivalent amount of gain. In brief, people are more sensitive to losses than to gains. Accordingly, the effect, if any, on the assessment of location resulting from guests venting their anger against hotels because of a failure in a specific service should be greater than the effect on the assessment of location derived from guests praising the hotel on account of a successful service. More generally, the tourist *punishes* the hotel more harshly for a dissatisfaction than *praises* it lavishly for a satisfaction. Therefore, we hypothesize that:

H.2. The effect of the evaluation of other hotel attributes on the assessment of location is asymmetric, with a higher impact over the negative range of ratings.

Also, according to the *diminishing sensitivity* of Prospect Theory (Kahneman & Tversky, 2013), the marginal impact of a gain or a loss is contingent upon the distance from the reference point (Erev, Ert, & Yechiam, 2008). That is, the marginal effect of the assessment of other hotel attributes on the evaluation of location depends on the distance from the reference point. In this regard, the idea that the magnitude of an effect is smaller the further it is from a reference point is well-recognized in literature on economics and psychology (Hill & Neilson, 2007; Thaler, 1981), which leads to the properties of reducing marginal rates of substitution in consumer theory, diminishing returns in producer theory, or discounting in intertemporal choice. Accordingly, a decrease in the rating of the staff's performance from 10 to 9 should have a smaller effect on the

location rating than a reduction from 7 to 6, given the equality of the reference point is 0. Note that the relative decrease in the former is lower than the latter. Hence, we state the following hypothesis:

H.3. The effect of a change in the evaluations of other hotel attributes on the assessment of location decreases with the distance from the reference point.

3. SAMPLE, VARIABLES AND METHOD

Sample

The data are obtained from Booking.com as it provides quantitative information on ratings of location as well as other items such as cleanliness, comfort, facilities, staff and value for money. The data collection was conducted in February 2018 and a sample of 487 hotels is obtained. The destinations in European countries where Booking.com is the dominant online travel agent and different types of accommodation (e.g. hotel, apartment, bed and breakfast) can be found. In particular, the destinations are Austria (5 hotels in Viena), Czech Republic (43 in Praga), France (28 in Paris), Ireland (24 in Dublin), Italy (58 in Florencia, 24 in Mestre, 87 in Roma, and 51 in Venecia), Netherlands (31 in Amsterdam), Spain (24 in Madrid, and 11 in Benidorm) and the UK (101 in London). With these hotels, 87 groups are created according to their location, with a range of 4 to 10 hotels in each group. For a hotel to be included in the sample, a minimum of 30 reviews were required.

Variables

Regarding the dependent variables, we build three dependent variables: 1) difference between the location rating of hotel i and the average location rating of the group of hotels that property i belongs to ($Diff_i$). A group of hotels is defined by those properties that are close enough to have the same surroundings, such as those located in the same street fewer than 100 meters away, in the same intersection or in the same square; 2) positive difference between the location rating of hotel i and the average location rating of its corresponding group ($Diff_i$>0); and 3) negative difference between the location rating of hotel i and the average location rating of its group ($Diff_i$<0). As for the independent variables, the main variable is the Average Global Rating (AGR) of the following items: cleanliness, comfort, facilities, staff and value for money, which are measured on a 2.5-10 scale (Mellinas, María-Dolores & García, 2015).

Control variables.

The accommodation type (Hotels 261, apartments 91, bed and breakfast 35 and hostel 100), where hostel and bed and breakfast are used as the reference base. Also, the city wherein the property is located is also controlled.

Data analysis

The analysis of the determinant factors of the location rating is conducted by estimating classical regression models to capture the general effect of the independent variables (test of hypothesis 1); Tobit models to analyse the impact of the explanatory variables on the positive and negative differences of the location rating (test of loss aversion in hypothesis 2); and quantile regressions to uncover potential differences of the effects of AGR over the range of the positive and negative

differences (test of diminishing sensitivity in hypothesis 3). The general OLS model is expressed as

$$y_i = \alpha + \sum_{k=1}^{K} \beta_k x_{ki} + \varepsilon_i$$

where α is a constant term; β_k is the parameter that shows the effect of the *k-th* independent variable x_{ki} for hotel *i*; ε_i is an normally-distributed error term; and y_i is defined, in the classical regression, as the difference between the location rating of hotel *i* and the average location rating of the group of hotels that property *i* belongs to, and in the Tobit model as the positive difference of this magnitude so that the actual variable observed is $y^*=\max(y,0)$ because of the left censoring, and as the negative difference of this magnitude so that the actual variable observed is $y^*=\min(y,0)$ because of the right censoring. This way, we can examine potential asymmetries in the effects of the explanatory variables.

Regarding the analysis of the changing impacts of AGRs, we use quantile regressions (QR). Accordingly, the conditional *τth* ($\tau \in (0, 1)$) quantile of the location rating is modeled and potential shifting patterns of effects on AGRs can be detected. It is customary to use the 10th, 25th, 50th, 75th, and 90th quantiles, and the procedure is as follows (Koenker & Bassett Jr, 1978):

Given a random variable *Y* whose probability distribution function is $F(y)=\text{Prob}(Y \leqq y)$, and considering that $0<\tau<1$, the τth quantile of *Y* is defined as the smallest *y* that holds $F(y) \geq \tau$: $Q(\tau)=\inf$ (*y*: $F(y) \geq \tau$.)

Taking *n* observations on *Y*, the empirical distribution function is given by $F_n(y)=\sum 1(Y_i \leqq y)$, where $1(z)$ is an indicator function that equals 1 if the argument *z* is true and 0 otherwise. Hence, the empirical quantile is defined as $Q_n(\tau)=\inf(y: F(y) \geq \tau)$. Expressed from the perspective of an optimization problem:

$$Q_n(\tau) = \arg\min_{\xi}\left\{\sum_{i:Y_i\geq\xi}\tau\left|Y_i-\xi\right|+\sum_{i:Y_i<\xi}(1-\tau)\left|Y_i-\xi\right|\right\}=\arg\min_{\xi}\left\{\sum_{i}\rho_\tau\left|Y_i-\xi\right|\right\}$$

where $r_t(u)=u(\tau-1(u<0))$ is the *check function* that asymmetrically weights both positive and negative values. Under the assumption of a linear specification for the conditional quantile of the variable "location rating" it is obtained that $Q(\tau|X_i,\beta(\tau))=X_i{}'\beta(\tau)$, where X_i is the vector of explanatory variables and $\beta(\tau)$ represents the vector of parameters linked to the t-th quantile. Thus, the optimization problem is:

$$\hat{\beta}_n(\tau) = \arg\min_{\beta(\tau)}\left\{\sum_{i}\rho_\tau(Y_i-X_i{}'\beta(\tau))\right\}$$

4. RESULTS

Table 1 shows the different parameter estimates conducted to analyze the effect of AGR on the location rating. For each analysis, the variable of interest is examined alone (equations 1, 3 and 5) and controlled for the type of accommodation (hotels and apartments) and the city wherein the property is located (equations 2, 4 and 6). In the general model (equations 1 and 2), the dependent variable (*Diff$_i$*) is the difference between the location rating of hotel i and the average location rating of the group of hotels that property i belongs to. The OLS estimates show that AGR has a significant and positive effect on the dependent variable, which means that the assessment of the other items is directly related to the location rating. Therefore, the latter is not independent from the former and hypothesis 1 cannot be rejected. Hence, it indicates that guests are not fully rational and their limited ability to process information plays an important role when evaluating location. Note that this result is even more remarkable as location may be considered more

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objectively measurable than others and allegedly its assessment should be independent from the other items rated. The control variables of accommodation types are not significantly different.

[Please insert Table 1 about here]

In the model with positive differences in the dependent variable ($Diff_i>0$) (equations 3 and 4), estimated through Tobit models, a positive and significant parameter is also found for AGR as in the general model. In this case, the apartments have a greater effect than hotels, which is in line with the literature wherein apartments are generally rated better than hotels (Zervas, Proserpio, & Byers, 2015). In the model with negative differences in the dependent variable ($Diff_i<0$) (equations 5 and 6), estimated also through Tobit models, a significant and positive parameter for AGR is also obtained. Note, however, that the magnitudes of this coefficient in equations 5 and 6 are significantly higher than in equation 3 ($t=8.46$; $p<0.01$) and equation 4 ($t=6.26$; $p<0.01$). This result implies an asymmetric effect of AGR on the dependent variable which is contingent upon its range; in particular, when the location rating of hotel i is lower than the average location rating of the group that this property belongs to ($Diff_i<0$), the influence of AGR is stronger than when the location rating of hotel i is higher than its group ($Diff_i>0$). This outcome confirms hypothesis 2 and is in line with the *loss aversion* phenomenon. In practical terms, this means that negative feelings that might derive from any of the other five items that comprise AGR causes a greater negative effect on the location rating of the hotel than the positive impact derived from positive feelings (which do have a positive effect on the location rating but its magnitude is smaller). In short, a failure in a hotel attribute has a greater effect on location ratings as this failure is more *annoying* than an equal-sized success being *satisfying*. The significance of the apartments

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disappears in the negative range of the dependent variable; thus, contrary to equations 3 and 4, no differences between hotels and apartments are found in equations 5 and 6.

Finally, with regard to the varying patterns of the effect of AGR on the location rating, Table 2 presents the following results: The general model ($Diff_i$) presents significant parameters in all the quantiles and AGR has a rather stable influence across quantiles, with the only exception of the 50% quantile, in which a reduction of its influence is observed. As the 50% quantile coincides with the zero value of this dependent variable, this diminution found for the positive values is in line with the previous results obtained in Table 1 where the effect of AGR is lower in the positive range of the dependent variable (equations 3 and 4) than in the negative range (equations 5 and 6).

[Please insert Table 2 about here]

The model with positive differences in the dependent variable ($Diff_i>0$) shows significant parameters in all the quantiles and the parameters have a downright stability across the different quantiles as no significant differences are found. It means that positive reactions (or *feelings*) in any of the five items contained in AGR bring about positive effects on the rate of location of the hotel in a homogeneous way. Therefore, no diminishing sensitivity is obtained, and hypothesis 3 cannot be accepted. More interestingly, however, the model with negative differences in the dependent variable ($Diff_i<0$) presents a clear decreasing pattern with significant reductions from the 50% to the 75% quantile and from the 75% to the 90% quantile. The parameter found for the 10% quantile of the dependent variable (where its values are the most negative) is the greatest; in particular, the effect of AGR is 0.3157. However, the parameter obtained for the 90% quantile

(where the values of the dependent variable are the least negative) is 0.1077, which is the lowest across quantiles. This result means that negative reactions in the five items of AGR cause negative effects on the location rating of the hotel in a heterogenous way: the stronger the negative feeling, the harsher the location rating is, and this harshness augments to reach the maximum over the most negative range of the dependent variable. This means that consumers tend to *punish* the hotel by rating the location very negatively because of some unpleasant events that might have happened to other attributes. Therefore, rather than diminishing sensitivity, we find "augmenting sensitivity", and thus, hypothesis 3 cannot be accepted.

Furthermore, using Kahneman and Tversky (2013)'s *value function v(x)* defined for an attribute *x*, Figures 1 and 2 depict the estimated effects. Figure 1 shows confirmation of loss aversion as we effectively obtain a line that is steeper for negative values than for positive values [$v(x) < -v(-x)$, x>0]. However, instead of finding a concave curve for positive values [$v''(x) < 0$, x>0] and a convex curve for negative values [$v''(x) > 0$, x<0] which would bring about the characteristic S-shaped curve, Figure 2 presents a line for the positive values (no diminishing sensitivity) and a concave curve for negative values (reverse diminishing sensitivity).

[Please insert Figures 1 and 2 about here]

5. CONCLUSIONS

The purpose of this article has been to analyze the interrelationships of perceived evaluations of hotel attributes between objective (rating of location) and subjective service elements (ratings of cleanliness, comfort, facilities, staff, and value for money). Previous literature has primarily focused on characteristics pertaining to external elements (e.g., traffic, safety, surroundings or convenience) in order to understand guests' perceptions about hotel location. Nevertheless,

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analysis of the effects of other service attributes on location is significant today owing to (1) the prevailing use of reviews (it is critical to disentangle the intricacies of their mechanics and the ways in which they exert an effect) and (2) the potential interdependence of the elements being rated (all the more remarkable when the perceptions of subjective measures can have an influence on objective measures).

In order to address the research objectives, prospect theory has been used as the analytical framework, with the results demonstrating *loss aversion* and *diminishing sensitivity* properties in the context of online consumer reviews. Indeed, assessment of location is directly influenced by the evaluation of other hotel attributes. This confirms the existence of interdependence among ratings of subjective and objective measures, derived from consumers' limitations when processing information (they cannot separate the effects of distinct attributes when rating) and their irrationality (dissatisfaction with an attribute can affect the perceptions of other more objectively measured attributes). This behavioral pattern is closely associated with the theory of cognitive dissonance, which describes the mental discomfort created by a contradiction between personal belief and newly obtained information (Cummings & Venkatesan, 1976).

Consumers who purchase hospitality products/services are, in general, likely to undergo cognitive dissonance due to their profound involvement in the information searching process and the high sums of spending (including financial and non-financial resources) involved (Kim, 2011; Tanford & Montgomery, 2015). When cognitive dissonance occurs (discrepancies between personal beliefs and experiences), the individual attempts to reduce such mental discomfort by changing or distorting the cognitions so as to make them more consonant. The greater the cognitive dissonance, the more motivated the individual is to diminish psychological tension by altering the cognitive element (Anderson, 1973). In this sense, when online consumers perceive hotel services

to be of lower quality than their expectations, cognitive dissonance might occur, and so they are more likely to provide negative review scores not only in terms of the subjective aspects of services (including staff, design, and cleanliness) but also regarding objective elements of the hotel property such as location.

Interestingly, the effect of the evaluation of other hotel attributes on the assessment of location was found to be asymmetric, with a superior impact over the negative range of ratings, in line with the loss aversion property. Indeed, following the example above, dissatisfaction causes a greater negative effect on the location rating than the positive impact derived from satisfaction. We have also noted that the effect of a change in the evaluation of other hotel attributes on the assessment of location is constant for the positive differences between the location rating of hotel i and the average rating of its group ($Diff_i > 0$), and increases for the negative differences ($Diff_i < 0$). Thus, the rating of the location derived from a negative feeling becomes harsher, so that when a guest feels dissatisfied with some hotel attribute and decides to punish the hotel through reviews and ratings, he or she does so very harshly. In either case (positive or negative range), the results are not in line with the *diminishing sensitivity* property. While no differences in the effects of accommodation types were identified over the negative range of the location rating (all types, if rated negatively, were similarly rated), apartments demonstrated a greater effect than hotels over the positive range.

These results have some relevant academic and managerial implications. Regarding the research implications, to the authors' knowledge, this is the first hospitality study that demonstrates the existence of assertions of prospect theory in the context of online consumer reviews for hotel services. Whereas previous hospitality studies have applied prospect theory to explain consumer behavior, this paper empirically sheds light on irrational information-seeking behavior and the

asymmetric influences of online review scores. A second theoretical contribution revolves around the fact that whereas loss aversion is manifested in the effect of hotel attributes on location, diminishing sensitivity seems to disappear or be reversed. Far from becoming satisfied – as would be expected according to this property of prospect theory – consumers develop a constant positive reaction derived from satisfaction, yet a dissatisfied negative attitude results from dissatisfaction. A third academic implication, of a more practical nature, pertains to the fact that the items being rated by consumers should not be considered in isolation as considerable interdependence appears to exist among them. As has been noted, the measurement of an attribute rating can be spurious owing to the influence of other attribute ratings. Therefore, when analyses involving ratings are conducted, the potential relationships between seemingly independent attributes must be considered and if possible controlled.

As for managerial implications, given the interdependence among attribute ratings, dealing with reviews must be carried out in a comprehensive way. Indeed, although attention should be paid to failure in a particular aspect of service, the recovery strategy must encompass several elements, especially when guests have voiced their disappointment publicly and with the potential to affect areas other than that causing dissatisfaction. Furthermore, a word of caution should be added when using the location rating to determine the best perceived location in a city, as its measurement might be biased. The same applies to the UNWTO's (2014) suggestion to integrate reviews into conventional hotel classifications. In short, ratings of hotel location can be spurious and their values may be biased due to being affected by the performance of other attributes.

Given that diminishing sensitivity is a key psychological trait of human behavior, it would in future be interesting to identify the influences that stimulate it to reverse. Furthermore, while the central element of analysis here has been location ratings as this attribute can be objectively

measured (in terms of spatial coordinates) and its intangibility is lower than other attributes, it would be helpful to examine whether the interdependence found in this article is also observed in relationship with other attributes. The expectation is that a strong interrelationship exists among them (indeed, if this is true of objective and subjective attributes, it might be assumed that such a relationship exists between merely subjective attributes). However, its quantification is crucial.
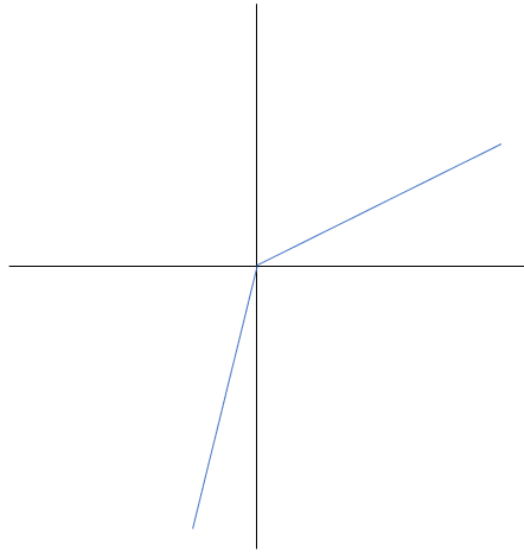
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Figure 1. Loss Aversion Hypothesis

Figure 2. Diminishing Sensitivity Hypothesis
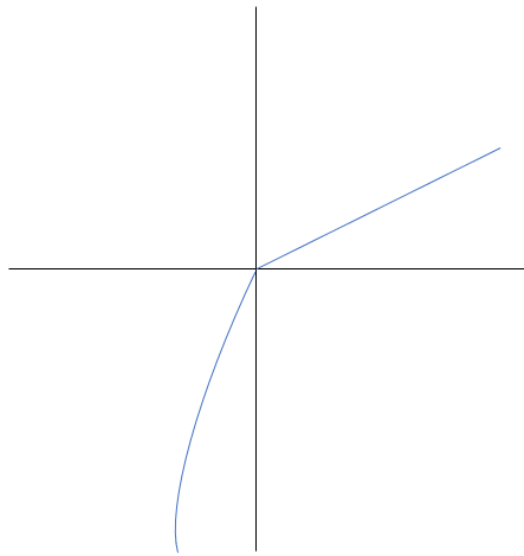
Table 1. Effect of AGR on the location rating

	General model (Dep variable = $Diff_i$)		Positive differences (Dep variable = $Diff_i>0$)		Negative differences (Dep variable = $Diff_i<0$)	
	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6
AGR (5 items)	0.2822[a]	0.3648[a]	0.0791[a]	0.1575[a]	0.2108[a]	0.2760[a]
	(0.0120)	(0.0113)	(0.0168)	(0.0182)	(0.0155)	(0.0183)
Hotels		0.0322		0.0321		0.0583
		(0.0285)		(0.0305)		(0.0348)
Apartments		0.0377		0.0781[b]		-0.0070
		(0.0377)		(0.0366)		(0.0500)
Controlled for cities		Yes		Yes		Yes
Constant	-2.1858[a]	-3.0232[a]	-0.3487[b]	-1.1856[a]	-1.8449[a]	-2.3878[a]
	(0.0939)	(0.1454)	(0.1406)	(0.2025)	(0.1098)	(0.2056)
OLS Goodness of fit						
R-squared	0.5327	0.6906	0.0789	0.3243	0.4551	0.5946
Adjusted R-squared	0.5317	0.6814	0.0753	0.2857	0.4526	0.5671
F-statistic	552.8[a]	75.25[a]	22.08[a]	8.40[a]	183.7[a]	21.68[a]
Observations	487	487	260	260	222	222

Note: a=$p<0.01$; b=$p<0.05$

Table 2. Varying patterns of the effect of AGR on the location rating

Variable	0.1	0.25	0.5	0.75	0.9
General model (Dep variable = $Diff_i$)					
AGR (5 items)	0.4054[a] (0.0187)	0.3793[a] (0.0160)	0.3431[a] (0.0147)	0.3482[a] (0.0183)	0.3401[a] (0.0207)
Differences across quantiles (p-values)		0.1179	0.0123[b]	0.7535	0.6595
Positive differences (Dep variable = $Diff_i > 0$)					
AGR (5 items)	0.0924[a] (0.0282)	0.1308[a] (0.0233)	0.1578[a] (0.0194)	0.1689[a] (0.0249)	0.1776[a] (0.0360)
Differences across quantiles (p-values)		0.1187	0.1950	0.6085	0.7831
Negative differences (Dep variable = $Diff_i < 0$)					
AGR (5 items)	0.3157[a] (0.0412)	0.3038[a] (0.0313)	0.2500[a] (0.0271)	0.1947[a] (0.0307)	0.1077[a] (0.0394)
Differences across quantiles (p-values)		0.7464	0.0577	0.0446[a]	0.0102[a]

Note: a=p<0.01; b=p<0.05